CLAIMS

1. A method of forming a discharge tube for a low-pressure discharge lamp, the discharge tube having at least one curved section, the method comprising the steps of

fastening a first end of a first bending section of the discharge tube with first clamping means,

holding a second end of the first bending section of the discharge tube in an oriented position, the second end being opposite the first end,

heating the first bending section to a softening temperature,

exerting a bending moment on the softened first bending section between the first end and the second end of the softened first bending section for achieving the desired radius or direction of curvature of the first bending section, in which

the holding of the second end of the softened first bending section and the exertion of the bending moment on the softened first bending section is effected at least partly with a re-solidified second bending section of the discharge tube, the re-solidified second bending section being adjacent to the softened first bending section.

2. The method of claim 1 in which the bending moment is exerted on the softened first bending section at least partly by a wall part of the first bending section.

3. The method of claim 1 in which the bending moment is exerted on the softened first bending section at least partly by a support member of the first clamping means.

4. The method of claim 3 in which the support member is a rim of a guiding aperture of the first clamping means.

5. The method of claim 1 comprising the following steps:

the discharge tube is initially fastened at a third end of a starting bending section with first clamping means and

a fourth end of the starting bending section of the discharge tube is fastened, the fourth end being opposite the third end,

the starting bending section is heated to a softening temperature,

a bending force is exerted between the third end and the fourth end of the softened starting bending section to achieve the desired radius or direction of curvature of the starting bending section, and

the fastening of the fourth end of the softened starting section and the bending force to the softened starting section is effected with second clamping means.

6. The method of claim 1 in which the first end of the softened first bending section is translated or tilted during the bending of the first bending section.

7. The method of claim 1 in which the discharge tube is formed as a double helix, and the starting section is adjacent to a central portion, and two legs of the discharge tube on two sides of the central portion are wound into the double helix form simultaneously.

8. The method of claim 7 in which the central portion of the discharge tube is formed to a cold chamber portion, and the starting sections of the discharge tube are held in oriented position by fastening the cold chamber portion.

9. The method of claim 7 in which the central portion of the discharge tube is formed to an S-shape in a molding form before bending with the bending moment.

10. The method of claim 1 in which the softened section is shifted along the principal longitudinal axis of the discharge tube substantially continuously.

11. The method of claim 1 in which portions of the discharge tube are pre-heated to a temperature below the softening temperature before bending.

12. The method of claim 1 in which the bending section is heated with any of the group containing hot air, gas flames or heating wire.

13. The method of claim 1 in which bent portions of the discharge tube are actively cooled to a temperature below the solidification temperature after bending.

14. The method of claim 13 in which the bent section is cooled with any of the group containing cold air, liquid spray, convection cooling, radiation cooling.

15. The method of claim 1 in which the internal pressure of the discharge tube is varied during the bending of the first bending section.

16. The method of claim 1 in which the length of the softened first bending section is less than six times the diameter of the discharge tube.

17. An apparatus for forming a discharge tube for a low-pressure discharge lamp, the discharge tube having at least one curved section with a predetermined radius or direction of curvature, the apparatus comprising

first clamping means for positioning a first end of a bending section of the discharge tube in an oriented position relative to a second end of the bending section and for exerting a bending moment on the first end,

second clamping means for positioning a third end of a starting bending section of the discharge tube in an oriented position relative to a fourth end of the starting bending section,

heating means for heating the bending section to a softening temperature,

controllable support means for positioning the first and second clamping means in predetermined position,

control means for synchronizing the operation of the controllable support means, the first and second clamping means and the heating means being suitable for achieving a

desired radius or direction of curvature of the bending sections heated to the softening temperature.

18. The apparatus of claim 17 in which the apparatus further comprises a support member for exerting at least partly a bending moment onto the first bending section.

19. The apparatus of claim 18 in which the support member is a rim of a guiding aperture.

20. The apparatus of claim 18 in which the support member is a separate member attached to the first clamping means at a distance from the first end of the first bending section.

21. The apparatus of claim 17 in which the apparatus further comprises cooling means for cooling at least a part of the bent sections of the first bending section to a temperature below the solidification temperature of the discharge tube.

22. The apparatus of claim 21 in which the cooling means comprises means for blowing cooling gas at least on a part of the bent sections of the first bending section

23. The apparatus of claim 21 in which the cooling means comprise means for spraying cooling liquid at least on a part of the bent sections of the first bending section.

24. The apparatus of claim 21 in which the cooling means is arranged to provide different cooling rates to different longitudinal or radial parts of the discharge tube.

25. The apparatus of claim 17 in which the second clamping means for positioning the third end of the starting bending section comprises a chuck receiving a central portion of the discharge tube.

26. The apparatus of claim 19 in which the chuck is rotatable.

27. The apparatus of claim 17 in which the first clamping means comprises end fastening means for positioning the ends of the discharge tube relative to the first bending section.

28. The apparatus of claim 27 in which the end fastening means is formed as a substantially straight rod with a diameter not larger than the diameter of the discharge tube.

29. The apparatus of claim 27 in which the end fastening means comprises an annular flange for insertion into the ends of the discharge tube, and anchoring means for securing the ends of the discharge tube on the annular flange.

30. The apparatus of claim 27 in which the apparatus comprises sealing means between the discharge tube and the end fastening means, and further comprises means for varying the pressure within the discharge tube.

31. The apparatus of claim 17 in which the apparatus further comprises means for pre-heating the discharge tube to a temperature below the softening temperature.

32. The apparatus of claim 17 in which the first clamping means comprises a heating chamber for pre-heating the discharge tube and guiding means for guiding the discharge tube in the heating chamber.

33. The apparatus of claim 17 in which the heating means are arranged to provide different heating rates to different longitudinal or radial parts of the discharge tube.

34. The apparatus of claim 17 in which the first clamping means also comprises the heating means.

35. The apparatus of claim 17 in which the first clamping means is rotatable around the principal axis of the straight sections of the discharge tube.

36. The apparatus of claim 17 in which the heating means comprises a gas burner head.

37. The apparatus of claim 36 in which the gas burner head comprises multiple, separately controllable burners.

38. The apparatus of claim 36 in which the apparatus comprises suctions means for directing the flames of the gas burner to the first end of the first bending section

39. The apparatus of claim 17 in which the heating means comprises means for blowing hot air onto the discharge tube.

40. The apparatus of claim 39 in which the hot air is heated by a gas burner.

41. The apparatus of claim 39 in which the hot air is heated by an electric heater.

42. The apparatus of claim 17 in which the heating means is arranged to heat the discharge tube through thermal radiation.